

AMENDMENTS TO THE CLAIMS

Please cancel Claims 12 and 13; amend Claims 1, 5, 7, 8, 11 and 14; and add new Claims 15-22 as follows.

LISTING OF CLAIMS

1. (currently amended) An air conditioner for a vehicle comprising:
 - a front air conditioning unit for air-conditioning a front area in a passenger compartment of the vehicle;
 - a rear air conditioning unit for air-conditioning a rear area in a passenger compartment;
 - a compressor for compressing refrigerant;
 - a condenser for condensing gas refrigerant discharged from the compressor in a cooling mode;
 - a front evaporator disposed in the front air conditioning unit, for cooling air in the cooling mode and for heating air in a first heating mode;
 - a rear evaporator disposed in the rear air conditioning unit for cooling air in the cooling mode;
 - a hot-gas bypass passage through which the gas refrigerant discharged from the compressor flows into the front evaporator while bypassing the condenser in the heating mode;
 - a front decompression unit, disposed between the condenser and the front evaporator, for decompressing refrigerant flowing from the condenser in the cooling mode;

a rear decompression unit, disposed between the condenser and the rear evaporator, for decompressing refrigerant flowing from the condenser in the cooling mode;

a refrigerant pipe to which a refrigerant outlet side of the front decompression unit and a refrigerant outlet side of the hot-gas bypass passage are joined; and

a low-pressure gas-liquid separator for separating refrigerant into gas refrigerant and liquid refrigerant, the low-pressure gas-liquid separator being coupled to a refrigerant outlet of the front evaporator and a refrigerant outlet of the rear evaporator, the low-pressure gas-liquid separator having a refrigerant outlet portion through which gas refrigerant is introduced to a suction port of the compressor, wherein

the refrigerant pipe has a refrigerant outlet that is connected to a refrigerant inlet of the front evaporator;

the condenser includes first and second heat-exchanging units which are disposed in this order in a refrigerant flow direction, and a high-pressure gas-liquid separator disposed between the first heat-exchanging unit and the second heat-exchanging unit for separating refrigerant into gas refrigerant and liquid refrigerant;

the front decompression unit is a fixed throttle;

the high-pressure gas-liquid separator regulates a stored amount of liquid refrigerant in response to a superheating degree of the gas refrigerant discharged from the compressor that is controlled to regulate a superheating degree of the gas refrigerant at an outlet of the front evaporator when at least the front air conditioning unit is operated under the cooling mode; [[and]]

the rear decompression unit regulates a superheating degree of gas refrigerant at an outlet of the rear evaporator independently from an operation of the front evaporator when the rear air conditioning unit is operated under the cooling mode;

a check valve is disposed between the rear evaporator and the low-pressure gas-liquid separator so as to shut a reverse flow from the low-pressure gas-liquid separator toward the rear evaporator;

the low-pressure gas-liquid separator has a first inlet coupled to the refrigerant outlet of the front evaporator and a second inlet independently formed from the first inlet and coupled to the refrigerant outlet of the rear evaporator; and

the check valve is located adjacent to the second inlet.

2.-4. (canceled)

5. (currently amended) The air conditioner according to claim 1, further comprising:

an evaporator outlet pipe having one end connected to the refrigerant outlet of the rear evaporator, and the other end connected to the low-pressure gas-liquid separator; [[and]]

~~a check valve disposed in the evaporator outlet pipe, for preventing a reverse flow from the low-pressure gas-liquid separator toward the rear evaporator,~~
wherein:

the evaporator outlet pipe has a wall portion defining a reduced passage area; and

the check valve has a valve body that contacts the wall portion when a ~~refrigerant flow from the gas-liquid separator toward the rear evaporator~~ the reverse flow is shut.

6. (original) The air conditioner system according to claim 5, further comprising:

an engagement portion provided in the valve body, wherein the engagement portion is engaged with the wall portion to regulate an opening degree of the check valve when the valve body is moved to a valve-opening position.

7. (currently amended) The air conditioner according to claim 1, further comprising:

an evaporator outlet pipe including a first pipe portion connected to the refrigerant outlet of the rear evaporator, and a second pipe portion connected to the low-pressure gas-liquid separator; ~~[[and]]~~ wherein

~~[[a]]~~ the check valve is disposed between the first pipe portion and a second pipe portion to be connected therebetween, ~~for preventing a reverse flow from the low-pressure gas-liquid separator toward the rear evaporator.~~

8. (currently amended) The air conditioner according to claim 1, wherein:
the refrigerant outlet side of the fixed throttle and the refrigerant outlet side of the hot-gas bypass passage are joined to the refrigerant pipe outside the passenger compartment, and

the refrigerant pipe is piped as a single introducing pipe from refrigerant cycle components outside the passenger compartment to the front air conditioning unit mounted in the passenger compartment.

9. (previously presented) The air conditioner according to claim 8, further comprising a valve device for switching the cooling mode and the heating mode and a joint portion at which the refrigerant outlet side of the fixed throttle and the refrigerant outlet side of the hot-gas bypass passage are joined, wherein

the refrigerant pipe extends from the valve device to the front evaporator.

10. (previously presented) The air conditioner according to claim 9, wherein:
the valve device is disposed on the condenser.

11. (currently amended) ~~[[An]]~~ The air conditioner for a vehicle according to Claim 1, further comprising:

~~a front air conditioning unit, including a front evaporator and a front heater~~
core[[.]] for providing [[a]] the front area in a passenger compartment of the vehicle with
~~air conditioning that includes a cooling mode and a~~ second heating mode;

~~a rear air conditioning unit, including a rear evaporator and a rear heater~~
core[[.]] for providing [[a]] the rear area in the passenger compartment of the vehicle
with air conditioning; wherein

~~a compressor for compressing refrigerant;~~

~~a condenser for condensing gas refrigerant discharged from the compressor in the cooling mode, the condenser including first and second heat-exchanging units which are disposed in a refrigerant flow direction and a high pressure gas-liquid separator, disposed between the first heat-exchanging unit and the second heat-exchanging unit, for separating refrigerant into gas refrigerant and liquid refrigerant and for accumulating the high pressure gas-liquid separator accumulates liquid refrigerant only in the cooling mode;~~

~~a hot-gas bypass passage through which gas refrigerant discharged from the compressor is introduced into the front evaporator while bypassing the condenser in the heating mode;~~

~~a front decompression unit, constructed with a fixed throttle connected to the condenser, for decompressing refrigerant flowing from the condenser in the cooling mode;~~

~~[[a]] the rear decompression unit[[,]] is constructed with a thermal expansion valve connected between the condenser and the rear evaporator, for controlling the superheating degree of the refrigerant flowing from the rear evaporator in the cooling mode;~~

~~a refrigerant pipe connecting the front decompression unit, the hot-gas bypass passage and the front evaporator; and~~

~~a low pressure gas-liquid separator connected to refrigerant outlets of the front and rear evaporators and to a refrigerant suction port of the compressor for separating refrigerant into gas refrigerant and liquid refrigerant and for accumulating the~~

low pressure gas-liquid separator accumulates liquid refrigerant only in the heating mode; and

~~wherein~~ the front decompression unit and the rear evaporator decompression unit are connected to the compressor by a high pressure liquid refrigerant pipe.

12.-13. (cancelled)

14. (currently amended) An air conditioner for a vehicle comprising:

a front air conditioning unit, including a front evaporator and a front heater core, for providing a front area in a passenger compartment of the vehicle with air conditioning that includes a cooling mode and a heating mode;

a rear air conditioning unit, including a rear evaporator and a rear heater core, for providing a rear area in the passenger compartment of the vehicle with air conditioning;

a compressor for compressing refrigerant;

a condenser for condensing gas refrigerant discharged from the compressor in the cooling mode, the condenser including first and second heat-exchanging units which are disposed in a refrigerant flow direction and a high pressure gas-liquid separator, disposed between the first heat-exchanging unit and the second heat-exchanging unit, for separating refrigerant into gas refrigerant and liquid refrigerant and for accumulating liquid refrigerant only in the cooling mode;

a hot-gas bypass passage through which gas refrigerant discharged from the compressor is introduced into the front evaporator while bypassing the condenser in the heating mode;

a front decompression unit, constructed with a fixed throttle connected to the condenser, for decompressing refrigerant flowing from the condenser in the cooling mode;

a rear decompression unit, constructed with a thermal expansion valve connected between the condenser and the rear evaporator, for controlling the superheating degree of the refrigerant flowing from the rear evaporator in the cooling mode;

a refrigerant pipe connecting the front decompression unit, the hot-gas bypass passage and the front evaporator;

a low pressure gas-liquid separator connected to refrigerant outlets of the front and rear evaporators and to a refrigerant suction port of the compressor for separating refrigerant into gas refrigerant and liquid refrigerant and for accumulating liquid refrigerant only in the heating mode; and

outlet pipe means for respectively connecting the refrigerant outlets of the front and rear evaporators to the low pressure gas-liquid separator, wherein

the outlet pipe means comprises a check valve that prevents the refrigerant flowing from the low pressure gas-liquid separator toward the rear evaporator[.];

a check valve is disposed between the rear evaporator and the low-pressure gas-liquid separator so as to shut a reverse flow from the low-pressure gas-liquid separator toward the rear evaporator;

the low-pressure gas-liquid separator has a first inlet coupled to the refrigerant outlet of the front evaporator and a second inlet independently formed from the first inlet and coupled to the refrigerant outlet of the rear evaporator; and

the check valve is located adjacent to the second inlet.

15. (new) The air conditioner according to claim 1, wherein the second inlet of the low-pressure gas-liquid separator is provided with the check valve.

16. (new) The air conditioner according to claim 1, wherein:
the low-pressure gas-liquid separator and the check valve are assembled as a single unitary component disposed outside the passenger compartment spaced from the rear evaporator.

17. (new) The air conditioner according to claim 16, wherein the check valve is threaded into the second inlet of the low-pressure gas-liquid separator.

18. (new) The air conditioner according to claim 16, wherein the check valve is integrally provided with the second inlet of the low-pressure gas-liquid separator.

19. (new) An air conditioner for a vehicle, comprising:

a compressor for compressing refrigerant;

a condenser for condensing gas refrigerant discharged from the compressor in a cooling mode;

a front evaporator for providing a front area in a passenger compartment of the vehicle with cool air in the cooling mode and warm air in a heating mode;

a rear evaporator for providing a rear area in the passenger compartment of the vehicle with cool air in the cooling mode;

a hot-gas bypass passage through which the gas refrigerant discharged from the compressor flows into the front evaporator while bypassing the condenser in the heating mode;

a low-pressure gas-liquid separator for separating refrigerant into gas refrigerant and liquid refrigerant, the low-pressure gas-liquid separator being coupled to a refrigerant outlet of the front evaporator and a refrigerant outlet of the rear evaporator, the low-pressure gas-liquid separator having a refrigerant outlet through which gas refrigerant is introduced to a suction port of the compressor; and

a check valve disposed between the rear evaporator and the low-pressure gas-liquid separator to shut a reverse flow from the low-pressure gas-liquid separator toward the rear evaporator, wherein:

the low-pressure gas-liquid separator has a first inlet coupled to the refrigerant outlet of the front evaporator, and a second inlet provided at a position separated from the first inlet and coupled to the refrigerant outlet of the rear evaporator; and

the check valve is disposed adjacent to the second inlet.

20. (new) The air conditioner according to claim 19, wherein the low-pressure gas-liquid separator and the check valve are assembled as a single unitary component disposed outside the passenger compartment spaced from the rear evaporator.

21. (new) The air conditioner according to claim 20, wherein the check valve is threaded into the second inlet of the low-pressure gas-liquid separator.

22. (new) The air conditioner according to claim 20, wherein the check valve is integrally provided with the second inlet of the low-pressure gas-liquid separator.